

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A defect data analysis method comprising the steps of:
obtaining defect position information by inspecting a substrate with an inspection apparatus, wherein the substrate is processed in a process of circuit pattern formation on the substrate;
storing the obtained defect position information in memory;
processing the defect position information stored in the memory using a processor;
obtaining a wafer map showing a distribution shape of defects ~~on the processed substrate~~ from the processed defect position information;
classifying the obtained distribution shape of defects on the wafer map into one of a plurality of distribution shape characteristic categories by using a defect distribution shape classifier and the processed defect position information, wherein the plurality of distribution shape characteristic categories comprises: repeated defects, clustered defects, arc-shaped regional defects, radial regional defects, line type regional defects, ring and blob type regional defects and random defects; and
displaying, on a display screen, the classified distribution shape of defects on the wafer map, wherein the distribution shape characteristic categories are each displayed using different colors.
2. (Previously presented) A defect data analysis method as claimed in claim 1, further comprising:
detecting the arc-shaped regional defects by obtaining a center candidate point of the distribution of defects on Cartesian coordinates and extracting the arc-shaped regional defects from corresponding polar coordinate information using the center candidate point as an origin.

3. (Previously presented) A defect data analysis method as claimed in claim 2, wherein the center candidate point of the distribution of defects is a point having more intersections of perpendicular bisectors of straight lines connecting two arbitrary defects among the defects distributed on the processed substrate.

4. (Original) A defect data analysis method as claimed in claim 1, wherein the defects classified into the arc-shaped regional defects are judged to be scratches generated by CMP (chemical mechanical polishing).

5. (Previously presented) A defect data analysis method as claimed in claim 1, wherein the radial regional defects are detected by creating distribution data on a ρ θ space based on information associated with the defects distributed on the processed substrate on Cartesian coordinate space and extracting the radial regional defects from the distribution data on the ρ θ space.

6. (Previously presented) A defect data analysis method as claimed in claim 5, further comprising:

converting the information associated with the defects distributed on the processed substrate on the Cartesian coordinate space into the defect position information on the polar coordinate space by using:

a distance between a straight line connecting two arbitrary defects on the processed substrate and an origin of the Cartesian coordinate space, and

an angle defined by an X axis and a perpendicular drawn from the origin of the Cartesian coordinate space to a straight line connecting two arbitrary defects.

7. (Currently amended) A defect data analysis method comprising the steps of:
obtaining defect distribution information on a processed substrate from defect position information, wherein the defect position information is obtained by inspecting the processed substrate with an inspection apparatus, the substrate being processed in a process for forming a circuit pattern on the substrate;

storing the obtained defect distribution information in memory;

processing the stored defect distribution information using a processor;

obtaining a wafer map showing a distribution shape of defects from the processed defect distribution information;

identifying repeated defects by using the wafer map processed defect distribution information, wherein the repeated defects are defects which are distributed on the substrate in a repeated pattern;

identifying clustered defects by using the wafer map processed defect distribution information, wherein the clustered defects are defects which are distributed on the substrate in a cluster;

identifying arc-shaped regional defects by using the wafer map processed defect distribution information, wherein the arc-shaped regional defects are defects which are distributed on the substrate in an arc-shape;

identifying radial regional defects by using the wafer map processed defect distribution information, wherein the radial regional defects are defects which are radially distributed on the substrate;

identifying line type regional defects by using the wafer map processed defect distribution information, wherein the line type regional defects are defects which are linearly distributed on the substrate;

identifying ring and blob type regional defects by using the wafer map processed defect distribution information, wherein the ring and blob type regional defects are defects which are distributed on the substrate in a ring and blob shape;

identifying random defects by using the wafer map processed defect distribution information, wherein the random defects are defects which are randomly distributed on the substrate; [[and]]

processing information associated with the identified defects using the processor, wherein the information is processed to classify differently identified defects into different defect distribution categories; and

displaying the processed information on the wafer map displayed on a display screen, wherein the processed information is displayed such that the different defect distribution categories are displayed using different colors.

8. (Canceled)

9. (Previously presented) A defect data analysis method as claimed in claim 7, wherein the arc-shaped regional defects and the radial regional defects are identified using defect polar coordinate information created according to the obtained defect distribution information.

10. (Previously presented) A defect data analysis method comprising the steps of:

creating a wafer map showing positions of defects on a coordinate system based on a wafer origin reference according to defect data including at least a defect position coordinate table of defects obtained by inspecting a processed substrate with an inspection apparatus, wherein the substrate is processed by forming a circuit pattern on the substrate;

storing the wafer map in memory; and

processing the wafer map stored in the memory using a processor, wherein processing the wafer map comprises:

weighting a point where a perpendicular of two arbitrary defects from the wafer map passes according to a distance between the two arbitrary defects,

voting the point onto Cartesian coordinate space,

detecting Cartesian coordinates corresponding to a maximum value on the voted space,

polar-coordinate-converting the wafer map onto $r\theta$ space using the detected Cartesian coordinates as an origin, and

identifying an arc-shaped regional defect according to a horizontal segment detected in a polar coordinate converted state.

11. (Previously presented) A defect data analysis method comprising the steps of:

creating a wafer map showing positions of defects on a coordinate system based on a wafer origin reference according to defect data including at least a defect position coordinate table of defects obtained by inspecting a processed substrate with an inspection apparatus, wherein the substrate is processed by forming a circuit pattern on the substrate;

storing the wafer map in memory; and

processing the wafer map stored in the memory using a processor, wherein processing the wafer map comprises:

weighting ρ , θ coordinates corresponding to a segment connecting two arbitrary defects from the wafer map according to a distance between the two arbitrary defects,

voting the ρ , θ coordinates,

detecting a plurality of peaks on the voted coordinates, and

when concentration of voting to a predetermined range around $\rho=0$ exceeds a predetermined threshold value, identifying a radial regional defect according to the peaks in the range.

12. (Currently amended) A defect data analysis apparatus comprising:

input means for inputting defect position information obtained by inspecting a processed substrate, wherein the substrate is processed by forming a circuit pattern on the substrate;

defect distribution calculation means for obtaining a wafer map showing a distribution shape of defects on the processed substrate from the defect position information;

defect distribution shape characteristic category classification means for classifying the distribution shape of defects on the wafer map ~~obtained by the defect distribution calculation means~~ into one of a plurality of distribution shape characteristic categories comprising: repeated defects, clustered defects, arc-shaped regional defects, radial regional

defects, line type regional defects, ring and blob type regional defects, and random defects, wherein the classifying is performed based on the defect position information; and
output means for outputting the classified distribution shape of defects on the wafer map.

13. (Currently amended) A defect data analysis apparatus as claimed in claim 12, wherein the output means includes a display section for displaying the classified distribution shape of defects on the wafer map, wherein the distribution shape characteristic categories are each displayed.

14. (Currently amended) A review system comprising:
an inspection apparatus for scanning a surface of a processed substrate by light or electronic beam to detect a foreign matter or a pattern defect on the processed substrate and outputting defect data comprising at least position coordinates of the detected foreign matter or the pattern defect; and

a defect data analysis apparatus for obtaining a wafer map showing a defect distribution shape characteristic using the position coordinates and for classifying the defect distribution shape characteristic on the wafer map into one of a plurality of defect distribution shape characteristic categories, wherein the plurality of defect distribution shape characteristic categories comprises: repeated defects, clustered defects, arc-shaped regional defects, radial regional defects, line type regional defects, ring and blob type regional defects, and random defects,

wherein an image of the [[each]] defect distribution shape characteristic is acquired by the light or the electron beam.

15. (Currently amended) A review system as claimed in claim 14, wherein the defect data analysis apparatus creates a report including [[of]] the classified defect distribution shape characteristic characteristics.